Shannon

MTH-4106 Factoring and Algebraic Fractions: **Worksheet #7**

Factor the following polynomials using the appropriate method:

1. $14a^4y^6c^2 - 7y^2cd^3 + 21a^2yc^6e - 7yc$

$7yc(2a^4y^5c - yd^3 + 3a^2c^5e - 1)$

2. $abc - c^2 - abd + cd + abe - ce$

$(abc - abd + abe) + (-c^2 + cd - ce)$

$ab(c - d + e) - c(c - d + e)$

$(ab - c)(c - d + e)$

3. $x^2 - 5x - 14$

$(x - 7)(x + 2)$

4. $3a^2 - 8ab + 4b^2$

$p = 12$

$s = -8$

$-2, -6$

$(3a^2 - 2ab)(-6ab + 4b^2)$

$a(3a - 2b) - 2b(3a - 2b)$

$(a - 2b)(3a - 2b)$

5. $-16a^4 + 9b^2$

$9b^2 - 16a^4$

$(3b - 4a^2)(3b + 4a^2)$

6. $-4x^6 + 3x^5 + 6x^3 - x^2 - 2x$

$x(-4x^5 + 3x^4 + 6x^2 - x - 2)$

OR $-x(4x^5 - 3x^4 - 6x^2 + x + 2)$

7. $6ax^2 - 2a + 15x^2y - 5y$

$(6ax^2 + 15x^2y) + (-2a - 5y)$

$3x^2(2a + 5y) - 1(2a + 5y)$

$\boxed{(3x^2 - 1)(2a + 5y)}$

8. $2 + b - b^2$

$-b^2 + b + 2$

$p = -2$

$s = +1$

$2, -1$

$(-b^2 + 2b)(-1b + 2)$

$b(-b + 2) + 1(-b + 2)$

$\boxed{(b + 1)(-b + 2)}$

9. $3y^2 + 7y - 6$

$p = -18$

$s = +7$

$9, -2$

$(3y^2 + 9y)(-2y - 6)$

$3y(y + 3) - 2(y + 3)$

$\boxed{(3y - 2)(y + 3)}$

10. $x^{16} - 16y^4$

$\boxed{(x^8 - 4y^2)(x^8 + 4y^2)}$

11. $8b^2x^4d^3 - 32b^3d^4x + 16byx$

$\boxed{8bx(bx^3d^3 - 4b^2d^4 + 2y)}$

12. $-2bxy + 6axy + 4ax^2 - 3by^2$

$(-2bxy - 3by^2) + (4ax^2 + 6axy)$

$-by(2x + 3y) + 2ax(2x + 3y)$

$\boxed{(-by + 2ax)(2x + 3y)}$

13. $x^2 - 8x + 15$

$(x-3)(x-5)$

14. $-3x^2 + 7xy - 2y^2$

$p = 6$

$s = 7$

$6, 1$

$(-3x^2 + 6xy) + (1xy - 2y^2)$

$-3x(x - 2y) + y(x-2y)$

$(-3x+y)(x-2y)$

15. $t^2 - 1$

$(t+1)(t-1)$

16. $-6p^3q^5 + 8p^2r^6 - 12p^5r^7 + 14r^3s^2 - 2s^3t^4$

$2(-3p^3q^5 + 4p^2r^6 - 6p^5r^7 + 7r^3s^2 - s^3t^4)$

17. $ax - bx + by + cy - cx - ay$

$(ax - bx - cx) + (-ay + by + cy)$

$x(a-b-c) - y(a-b-c)$

$(x-y)(a-b-c)$

18. $2 - 3b + b^2$

$b^2 - 3b + 2$

$(b-2)(b-1)$

19. $21g^2 - 8gf - 5f^2$

$p = -105$

$s = -8$

$-15, +7$

$(21g^2 - 15gf) + (7gf - 5f^2)$

$3g(7g - 5f) + f(7g - 5f)$

$\boxed{(3g+f)(7g-5f)}$

20. $4 - m^2$

$\boxed{(2-m)(2+m)}$

21. $xy - x^2$

$\boxed{x(y-x)}$

22. $a^2x + abx + 2ac + 3aby + 3b^2y + 2bc$

$(a^2x + abx) + (2ac + 2bc) + (3aby + 3b^2y)$

$ax(a+b) + 2c(a+b) + 3by(a+b)$

$\boxed{(ax + 2c + 3by)(a+b)}$

23. $x^2 + 9x + 20$

$\boxed{(x+4)(x+5)}$

24. $3t^2 + 7t - 6$

$p = -18$

$s = +7$

$-2, 9$

$(3t^2 - 2t) + (9t - 6)$

$t(3t-2) + 3(3t-2)$

$\boxed{(t+3)(3t-2)}$

25. $16ab^4 - 25b^2$

$b^2(16ab^2 - 25)$

26. $6x - 4x^2$

$2x(3 - 2x)$

27. $2a^2b^3y + 3ab^3x^2 - y + ab^3y - 3x^2 + 6a^2b^3x^2$

$(2a^2b^3y + 6a^2b^3x^2) + (ab^3y + 3ab^3x^2) + (-y - 3x^2)$

$2a^2b^3(y + 3x^2) + ab^3(y + 3x^2) - 1(y + 3x^2)$

$(2a^2b^3 + ab^3 - 1)(y + 3x^2)$

28. $x^2 - x - 42$

$(x - 7)(x + 6)$

29. $35 - 38x + 8x^2$

$8x^2 - 38x + 35$

$p = 280$

$s = -38$

$-28, -10$

$(8x^2 - 28x) + (-10x + 35)$

$4x(2x - 7) - 5(2x - 7)$

$(4x - 5)(2x - 7)$

30. $121 - 1.96y^6$

$(11 + 1.4y^3)(11 - 1.4y^3)$

31. $4a^2 - a$

$a(4a-1)$

32. $12x^3 + 24x^2 - 5y^2 + 20xy^2 - 6x + 10x^2y^2$

$(-5y^2-6x) + (10x^2y^2+12x^3) + (20xy^2+24x^2)$

$-1(5y^2+6x) + 2x^2(5y^2+6x) + 4x(5y^2+6x)$

$(4x+2x^2-1)(5y^2+6x)$

33. $x^2 - xy - 72y^2$

$(x-9y)(x+8y)$

34. $-4x^2 + 23xy - 15y^2$

$(-4x^2+20xy)+(3xy-15y^2)$

$-4x(x-5y) + 3y(x-5y)$

$(-4x+3y)(x-5y)$

$p = 60$

$s = 23$

$20, 3$

35. $\frac{25x^2}{16} - 81y^2$

$\left(\frac{5x}{4}-9y\right)\left(\frac{5x}{4}+9y\right)$

36. $2x^3 - 3x^2$

$x^2(2x-3)$

37. $12m^2 - 11m + 2$

$p = 24$

$s = -11$

$-3, -8$

$(12m^2 - 3m)(-8m + 2)$

$3m(4m-1) - 2(4m-1)$

$(3m-2)(4m-1)$

38. $8xy^5 - 4m^2ny^3 - 3m^3n^2 + 6mnxy^2 - 3mn - 4y^3$

$(6mnxy^2 + 8xy^5) + (-3mn - 4y^3) + (-3m^3n^2 - 4m^2ny^3)$

$2xy^2(3mn + 4y^3) - 1(3mn + 4y^3) - m^2n(3mn + 4y^3)$

$(2xy^2 - 1 - m^2n)(3mn + 4y^3)$

39. $k^2 - 11kl - 180l^2$

$p = -180$

$s = -11$

$9, -20$

$(K + 9l)(K - 20l)$

40. $1 - c^2$

$(1-c)(1+c)$

41. $-6x^2 - 11x - 4$

$p = 24$

$s = -11$

$-3, -8$

$(-6x^2 - 3x)(-8x - 4)$

$-3x(2x+1) - 4(2x+1)$

$(-3x-4)(2x+1)$

42. $-2b^3 - 6b^2$

$-2b^2(b+3)$ OR $2b^2(-b-3)$

43. $c^2 - 27cd + 50d^2$

$(c-2d)(c-25d)$

44. $-a^2 + 6ab - 8b^2$

$p = 8$

$s = 6$

$2, 4$

$(-a^2 + 2ab) + (4ab - 8b^2)$

$-a(a-2b) + 4b(a-2b)$

$(-a+4b)(a-2b)$

45. $-x^4 + 25$

$25 - x^4 = (5-x^2)(5+x^2)$

46. $7t^2 - 17tu + 6u^2$

$p = 42$

$s = -17$

$-14, -3$

$(7t^2 - 14tu) + (-3tu + 6u^2)$

$7t(t-2u) - 3u(t-2u)$

$(7t-3u)(t-2u)$

47. $9wz^2 - 81z^4$

$9z^2(w - 9z^2)$

48. $(7a^2c^2 - 21c) + (-9a^4c + 27a^2)$

$7c(a^2c - 3) - 9a^2(a^2c - 3)$

$(7c - 9a^2)(a^2c - 3)$

49. $6p^2 - 13pr + 2r^2$

$p = 12$

$s = -13$

$-12, -1$

$(6p^2 - 12pr)(-1pr + 2r^2)$

$6p(p-2r) - r(p-2r)$

$(6p-r)(p-2r)$

50. $\frac{9n^2}{36} - 49p^2$

$\left(\frac{3n}{6} + 7p\right)\left(\frac{3n}{6} - 7p\right) = \left(\frac{n}{2} + 7p\right)\left(\frac{n}{2} - 7p\right)$

51. $6y^2 + 7yz - 3z^2$

$p = -18$

$s = 7$

$9, -2$

$(6y^2 + 9yz)(-2yz - 3z^2)$

$3y(2y+3z) - z(2y+3z)$

$(3y-z)(2y+3z)$

52. $a^2 + a - 42$

$(a+7)(a-6)$

53. $225 - 1.69w^2$

$(15-1.3w)(15+1.3w)$

$(-1)(1.3w-15)(1.3+15)$

54. $35a^6b^5c + 42a^5b^4cd^2 - 28a^7b^3 - 21a^3b^4 + 14a^4b^3 - 7a^3b^2$

$7a^3b^2(5a^3b^3c + 6a^2b^2cd^2 - 4a^4b - 3b^2 + 2ab - 1)$

55. $3by^2 - 3b - c + 6bz^3 + cy^2 + 2cz^3$

$(2cz^3 + 6bz^3) + (cy^2 + 3by^2) + (-c - 3b)$

$2z^3(c + 3b) + y^2(c + 3b) - 1(c + 3b)$

$(2z^3 + y^2 - 1)(c + 3b)$

56. $9 - x^2$

$(3 - x)(3 + x)$ $= (-1)(x - 3)(x + 3)$

57. $9r^2 - 6r + 1$

$p = 9$

$s = -6$

$-3, -3$

$(9r^2 - 3r)(-3r + 1)$

$3r(3r - 1) - 1(3r - 1)$

$(3r - 1)(3r - 1)$

58. $x^2 - 7x + 10$

$(x - 2)(x - 5)$

59. $2a^2 + a$

$a(2a + 1)$

60. $2q^2 - 5qr + 2r^2$

$p = 4$

$s = -5$

$-4, -1$

$(2q^2 - 4qr)(-1qr + 2r^2)$

$2q(q - 2r) - r(q - 2r)$

$(2q - r)(q - 2r)$